Materials and Manufacturing Processes Community of Interest

National Leadership In Delivering *Technology Products* and the *Scientific and Engineering Expertise* To Maintain And Enhance U.S. Defense Capability

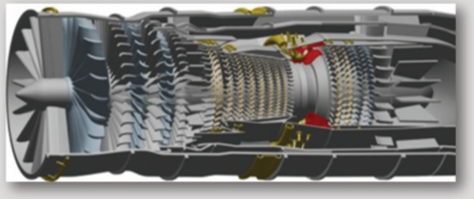
Example Success

Airfield Recovery After Attack
Rapid Airfield Damage Repair (RADR)
AFCEC, AFRL, USACE, ERDC, NAVAIR

Technologies/Benefits
- New Airfield Repair Materials
  - Flowable fill backfill - hours to minutes
  - Rapid-setting concrete - days to hours
- Specialized and multi-use repair vehicles
- Scalable matting solution for cargo/fighter
- Command & Control Training Simulator
- Sustainment Pavement Repair Kit
- Optimized Tactics, Techniques, & Procedures
- Geospatial Solutions for Damage Management

High Temperature Composites Materials for Advanced Turbine Engines
Enabling the future mission
Air Force, Navy

Technologies/Benefits
- Program matures high temperature composites, enabling efficiency, range, and loiter goals for future advanced turbine engines
  - Ceramic Matrix Composites (CMCs)
  - Polymer Matrix Composites (PMCs)



Tier 1 Materials and Manufacturing Processes COI Taxonomy

M&P for Survivability & Life Extension	Civil Engineering	Mfg. Technology for Affordability	Environmental Quality
Comprised of all materials and processes that enable mission operations; contains Technical Area Teams (TATs)	Supports all aspects of technology vital to force protection, projection, and sustainment; projects are reported in TAT7	Contains materials, processes, and fabrication techniques to significantly change the mfg. cost curve; efforts are integrated into all TAT roadmaps	Reflects DoD activities conducted within the DoD-DoE Strategic Environmental R&D Program

Tier 2 TATs Develop Materials and Manufacturing Processes for:

(1) Structures & Protection
- Platform M&MP
- Survivable Structural M&MP
- Multifunctionality

(2) Propulsion & Extreme Environments
- Turbine Engines
- Missile Propulsion
- Hypersonic Capabilities
- Railgun/Directed Energy
- Reactive/Energetic Materials

(3) Electronics and Sensors
- Sensors
- Next-generation Devices
- Electromagnetic Transparencies
- Photonics

(4) Power & Energy
- Generation and Conversion
- Electromechanical Conversion
- Energy Storage
- Power Control and Distribution

(5) Readiness
- Non-destructive Evaluation/Inspection
- Prognostics
- Wear Resistant, Hard Coatings, Fluids, Lubes
- Repair

(6) the Individual Warfighter
- Warfighter Protection
- Materials for Logistics
- Warfighter Enhancement
- Bio/Bio-inspired Materials

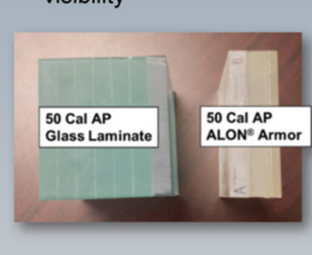
(7) Civil Engineering
- Force Protection for Facilities
- Force Projection and Maneuver
- Sustainability of Critical Infrastructure

(8) Corrosion
- Corrosion Mechanisms
- Surface Protection
- Corrosion Modeling
- In-situ Corrosion Detection
- Corrosion Repair

Example Success (JDMPT)

Transparent Ceramics
Aluminum Oxynitride (ALON®)
Army, Navy, Air Force

Technologies/Benefits
- Increased manufacturability, affordability, and availability of large windows for infrared and transparent armor applications
- Upscale ALON® windows from 2.8 to 9 square ft.
- Reduced cost and cycle time by 50% for large windows
- Higher transmission of 40% for Gen III night vision goggles – improved situational awareness
- Transitioned ALON® to UH-60 Blackhawk, allowing pilot protection without affecting visibility



Engagement Opportunities for Industry

- National Defense Industrial Association (NDIA) Science & Technology Conference
- Annual Persh Conference
- National Research Council, Defense Materials, Manufacturing and Infrastructure (DMMI)
- Joint Defense Manufacturing Technology Panel (JDMTP)
- Independent Research and Development (IRAD), Technology Interchange Meeting (TIM)
- Partner through National Manufacturing Institutes

Focus Going Forward

- Cross Service Collaboration on Emerging Solutions for Materials and Manufacturing Processes
- Determine Capability Gaps and Science & Technology for the Future Fight